Annals of Clinical and Analytical Medicine
Original Research

Validation of the Japan score in patients with upper gastrointestinal system bleeding and comparison with other scores

Abuzer Özkan[1], Kadir Özsivri[1], Serdar Özdemir[2], Abuzer Coşkun[1]
[1] Department of Emergency Medicine, University of Health Sciences Bağcılar Training and Research Hospital
[2] Department of Emergency Medicine, Health of Sciences University, Ümraniye Training and Research Hospital, Istanbul, Turkey

Abstract

Aim: Upper gastrointestinal bleeding is a life-threatening emergency. Endoscopic intervention facilities are not available in all hospitals, and the number of personnel performing this procedure is insufficient to provide 24-hour service. Scales are being developed to predict endoscopic intervention in AUGB. Japan score is one of them.

Material and Methods: The study was designed prospectively. It was performed between 02-02-2023 and 02-06-2023. The study was carried out on patients who were admitted to the emergency department with the suspicion of upper gastrointestinal bleeding and were diagnosed with non-variceal upper GI bleeding after endoscopic examination.

Results: A total of 65 patients were included in the study. The median age was 61.0 years (44.0, 78.0); 46 were men (71%). Among the scores, Japan Score was the strongest predictor of the need for Endoscopic intervention (AUC 0.750).

Discussion: The Japan score, which is simpler to use and has a stronger predictive ability, can be used in this patient group compared to the relatively older scorings used to predict endoscopic intervention in UGIB.

Keywords

Upper Gastrointestinal Bleeding, Scores, Japan Score, Endoscopy, Glasgow Blatchford Score

DOI: 10.4328/ACAM.21834 Received: 2023-07-27 Accepted: 2023-08-28 Published Online: 2023-08-30 Printed: 2023-09-01 Ann Clin Anal Med 2023;14(9):854-858
Corresponding Author: Abuzer Özkan, Department of Emergency Medicine, Health of Sciences University, Bağcılar Training and Research Hospital, Istanbul, Turkey.
E-mail: ebuzerozkan@gmail.com P: +90 505 615 55 50
Corresponding Author ORCID ID: https://orcid.org/0000-0003-4284-0086
This study was approved by the Ethics Committee of Umraniye Training and Research Hospital (Date: 2022-08-11, No: 258)

Introduction

Acute abdominal pathologies are important in emergency practice because they are life-threatening. Acute gastrointestinal bleeding constitutes 6-9.7% of acute abdominal pathologies presenting to the emergency department [1,2]. The ligament of Treitz anatomically defines upper gastrointestinal bleeding (UGIB) [3]. Non-steroidal anti-inflammatory drug use, Helicobacter pylori and ulcerative diseases are the most common causes of UGIB [3]. Hospitalization rates are relatively high and 30-day mortality ranges from 9 % to 14% [4]. When patients are admitted to the hospital, there are signs and symptoms such as melena, hematochezia, coffee grounds vomiting, and syncope [5].

The reason why UGIB is life-threatening is the ongoing bleeding or the risk of re-bleeding. Endoscopic interventions are the primary treatment modality in patients with ongoing bleeding or a high probability of re-bleeding [6]. Endoscopic intervention facilities are not available in all hospitals and the number of qualified personnel performing this procedure is insufficient to provide 24-hour service. These conditions raise the question of what the timing of endoscopic intervention should be in all patients with UGIB. Scorings have been developed for the planning of endoscopic intervention in UGIB [7]. Glasgow Blackford (GBS), Pre-Rockall, MAPS and AIMS65 are the most commonly used [8,9]. Efforts to develop new scores are still ongoing. H3B2 and Japan score are some of them [10,11].

While developing the scoring, the studied patient groups differ. There are many different variables such as eating habits, age, disease susceptibility in the region, genetic risk factors, sociocultural level. The generalizability of a score developed in any patient group may be limited to similar populations. Validation of scoring is done for each country and patient population. In this study, we wanted to confirm the Japan score, which was studied in the Japan UGIB patient group and claimed to be successful, in the Turkish patient group.

Material and Methods

The study was designed prospectively. It was performed in Umraniye Training and Research Hospital between 02-02-2023 and 02-06-2023. Patients presenting to the emergency department with non-variceal UGIB were included. Patients who did not undergo endoscopic evaluation and refused to participate in the study were excluded. Endoscopic examinations of all patients were performed within the first 6 hours or within 12 hours at the latest. The Forrest classification was used for reporting endoscopic evaluations of all patients. Patients were divided into two groups: requiring intervention and not requiring intervention. According to the Forrest classification, Ia, 1b and IIa were the groups that required endoscopic intervention. Other Forrest classes were included in the group not requiring endoscopic intervention. The amount of erythrocyte suspension administered in the first 24 hours was recorded in units. Blood transfusion was not considered an interventional procedure. Patient age, gender, SpO_2, diastolic and systolic blood pressure, fever, respiratory rate, pulse rate, melena, coffee grounds vomiting, presence of hematemesis or syncope, hemogram values, blood urea nitrogen, albumin, estimated glomerular filtration rate (eGFR), international normalized rate (INR), comorbid diseases, Forrest category, discharge, service, intensive care hospitalization and in-hospital death status were recorded. NEWS-L, Pre-Rockall, AIMS65, GBS, and Japan scores were calculated at admission for all patients. Parameters included in the Japan score are Systolic blood pressure <100 mmhg 2 points, Syncope 2 points, Hematemesis 3 points, Hemoglobin <10 g/dl 1 point, Blood Urea Nitrogen (mg/dl) ≥22.4 2 points, eGFR ≤60 mL/min per 1.73 m^2 -2 points, antiplatelet agents -2 points. Ethical approval was obtained from the local ethics committee with number 258 on 2022-08-11.

Statistical analysis

Ordinal and Continuous data are shown with median and 25^{th} and 75^{th} quartiles. Categorical variables were expressed as percentages. Ordinal variables were calculated with the Mann-Whitney U test and categorical variables with the chi-square test or Fisher's exact test. The power of the scores to predict the need for endoscopic intervention was evaluated with the receiver operating characteristic (ROC) test. The significant upper limit for the p-value was determined as 05%. For statistical calculations, the Jamovi (Version 1.6.21.0; The Jamovi Project, 2020; R Core Team, 2019) statistical program was used.

Ethical Approval

Ethics Committee approval for the study was obtained.

Results

A total of 65 patients were included in the study. The median age was 61 years (25th and 75th quartiles: 44-78); 46 (71%) were men. The most common disease was chronic renal failure with 60 (92.3%) individuals; 49 patients (75.4%) had a history of gastrointestinal bleeding. Comorbidity rates were not different in the two groups. The hemoglobin value was 8.2 (6.7-11.5) in the group requiring intervention and 9.5 (7.6 -11.6) in the group not requiring intervention, but this did not make a significant difference (p=0.380). There was no significant difference in INR values either (p=0.172). While there was no significant difference in the vital parameters of systolic blood pressure and respiratory rate, diastolic blood pressure was different between the groups (p=0.110, 0.308, 0.030, respectively). The most common complaints were hematochezia in 60 (92.3%) and melena in 45 (69.2%) patients. Erythrocyte suspension transfusion was administered to 44 (67.7%) individuals. There was no significant difference between the groups in the need for blood transfusion (p= 0.990). The Japan score was significantly different between the groups with and without the need for endoscopic intervention (p=0.018). There was no significant difference between groups in terms of AIMS65, Glasgow-Blatchford Score, Pre-Rockall Score and NEWS-L scores. Baseline characteristics of the groups requiring intervention and not requiring intervention are shown in Table 1. Among the scores, Japan Score was the strongest predictor of the need for Endoscopic intervention (AUC 0.750 Sensitivity 75%, specificity 64.91%). The highest value in the ROC curves was also in the Japan score (Figure 1). The area under the receiver operating characteristic curve values is presented in Table 2. When the threshold value of the Japan score was taken as 5 in the odds ratio calculations, the result was 5.55 (1.02-30.8). This value was better than the results found in other scorings (Table 3).

Table 1. Baseline characteristics of the enrolled patients and their comparison between the groups requiring intervention and not requiring intervention.

	Intervention not needed (n=57, 88 %)	Intervention needed (n=8, 12%)	Total (n=65, 100%)	p
Age (25th-75th percentiles)	61.0 (43.0 to 76.0)	78.0 (64.5 to 81.5)	61.0 (44.0 to 78.0)	0.072
Female (%)	15 (26.3)	4 (50.0)	19 (29%)	0.335
Male (%)	42 (73.7)	4 (50.0)	46 (71%)	
Diabetes mellitus (%)	12 (21.1)	3 (37.5)	15 (23.1)	0.373
Hypertension (%)	30 (52.6)	4 (50.0)	34 (52.3)	0.999
Coronary artery disease (%)	27 (47.4)	4 (50.0)	31 (47.7)	1.000
Heart failure (%)	2 (3.5)	2 (25.0)	4 (6.2)	>0.99
Chronic obstructive pulmonary disease (%)	3 (5.3)	0 (0.0)	3 (4.6)	>0.990
Chronic kidney disease (%)	52 (91.2)	8 (100.0)	60 (92.3)	>0.990
Cerebral vascular disease (%)	5 (8.8)	0 (0.0)	5 (7.7)	0.990
Active malignancy (%)	4 (7.0)	1 (12.5)	5 (7.7)	0.493
Cirrhosis (%)	5 (8.8)	0 (0.0)	5 (7.7)	0.990
Anticoagulants use (%)	10 (17.5)	1 (12.5)	11 (16.9)	0.990
Gastrointestinal bleeding history (%)	44 (77.2)	5 (62.5)	49 (75.4)	0.990
Laboratory parameters (%,25th to 75th percentiles)				
Lactate (mg/dl)	2.0 (1.5 to 2.7)	3.4 (2.8 to 4.4)	2.1 (1.5 to 3.2)	0.049
Ph	7.4 (7.3 to 7.4)	7.4 (7.3 to 7.4)	7.4 (7.3 to 7.4)	0.718
Hemoglobin (g/dl)	9.5 (7.6 to 11.6)	8.2 (6.7 to 11.5)	9.5 (7.5 to 11.6)	0.380
Hematocrit (%)	30.5 (23.7 to 35.5)	27.5 (21.1 to 34.9)	29.5 (22.8 to 35.5)	0.590
White blood cell count (10^3/µl)	10.1 (8.1 to 13.3)	15.6 (8.3 to 20.0)	10.1 (8.1 to 14.9)	0.247
Platelet count (10^3/µl)	246.0 (211.0 to 335.0)	259.0 (177.0 to 298.2)	246.0 (203.0 to 335.0)	0.611
Albumin (g/dl)	3.6 (3.3 to 4.0)	3.1 (2.8 to 3.6)	3.6 (3.1 to 4.0)	0.112
International normalized ratio	1.1 (1.0 to 1.3)	1.2 (1.2 to 1.3)	1.1 (1.0 to 1.3)	0.172
Blood urea nitrogen (mg/dl)	66.1 (43.6 to 110.0)	76.5 (53.0 to 107.2)	68.3 (43.6 to 110.0)	0.857
Vital parameters (25th to 75th percentiles)				
Systolic blood pressure (mm/hg)	120.0 (105.0 to 132.0)	96.5 (93.0 to 119.5)	119.0 (101.0 to 132.0)	0.110
Diastolic blood pressure (mm/hg)	68.0 (60.0 to 76.0)	59.0 (51.2 to 62.2)	67.0 (58.0 to 75.0)	0.030
Pulse rate (b/min.)	90.0 (78.0 to 103.0)	89.0 (82.5 to 105.5)	90.0 (78.0 to 104.0)	0.976
Oxygen saturation (%)	97.0 (96.0 to 98.0)	96.0 (93.0 to 97.2)	97.0 (96.0 to 98.0)	0.185
Respiratory rate (b/min.)	21.0 (16.0 to 22.0)	21.0 (18.0 to 26.5)	21.0 (16.0 to 24.0)	0.308
Temperature (°C)	36.6 (36.4 to 37.1)	36.5 (36.1 to 36.6)	36.5 (36.4 to 37.0)	0.237
Symptoms				
Hematemesis (%)	21 (36.8)	5 (62.5)	26 (40.0)	0.250
Melena (%)	41 (71.9)	4 (50.0)	45 (69.2)	0.238
Hematochezia (%)	53 (93.0)	7 (87.5)	60 (92.3)	0.493
Syncope (%)	4 (7.0)	1 (12.5)	5 (7.7)	0.254
Blood transfusions	2 (0 to 2)	3 (1 to 5)	2 (0 to 3)	0.158
Blood transfusions need (%)	38 (66.7)	6 (75)	44 (67.7)	0.990
Scores (25th to 75th percentiles)				
Japan Score	3 (2 to 5)	5.0 (5 to 6)	3.0 (2 to 5)	0.018
AIMS65 Score	1.0 (0 to 1)	1.0 (1 to 2)	1.0 (0 to 2)	0.364
Glasgow-Blatchford Score	11 (8 to 13)	11 (9 to 14)	11.0 (8 to 14)	0.733
Pre-Rockall Score	3 (1 to 4)	5 (3 to 5)	3 (2 to 5)	0.127
NEWS-L Score	4 (3 to 6)	8 (4 to 13)	5 (3 to 8)	0.083

Table 2. Area under the receiver operating characteristic curve values of scores.

	Cut point	Sensitivity (%)	Specificity (%)	PPV (%)	NPV (%)	AUC
Japan Score	5	75%	64.91%	23.08%	94.87%	0.750
AIMS65 Scoring	2	75%	42.11%	15.38%	92.31%	0.600
Glasgow-Blatchford Scoring	11	37.50%	77.19%	18.75%	89.80%	0.540
Pre-Rockall	6	50%	85.96%	33.33%	92.45%	0.670
NEWS+L	7	62.50%	77.19%	27.78%	93.62%	0.690

Abbreviation; AUC: area under the curve; PPV: positive predictive value; NPV: negative predictive value.

Table 3. Odds ratios of the scores and 95% confidence intervals.

	Value	95% confidence intervals.	
		Lower	Upper
Japan Score	5.55	1.2	30.8
AIMS65	1.84	0.39	8.71
Glasgow-Blatchford	0.78	0.18	3.44
Pre-Rockall	1.89	0.18	19.43
NEWS-L	5.64	1.19	26.83

Discussion

In this study, we evaluated the success of the Japan score in predicting the need for endoscopic intervention in Turkish UGIB patients. This is a validation study. We also compared it with the commonly used Pre-Rockall, Glasgow Blackfort, AIMS65 and NEWS-L scores. The Japan score successfully predicted the need for endoscopic intervention and we found it to be a stronger guide than other scores. To the best of our knowledge, this study is the first validation study of the Japan score on Turkish patients.

UGIB is a disease with high mortality, morbidity, and cost. It has an important place among acute abdominal pathologies [1]. According to the hemodynamic status of patients, endoscopic imaging is recommended within the first 24 hours [12]. It has been shown that early endoscopic imaging can be beneficial for patients [13]. Determining the need for an interventional procedure without endoscopic imaging will both prevent unnecessary procedures for patients and reduce costs [14]. The most effective method against this problem is scoring systems using patient data. In addition to scores such as Pre-Rockall, Glasgow Blackfort, AIMS65, new scores such as H3B2 and Japan score have appeared in the literature [15]. Poor prognosis and evaluation of the possibility of re-bleeding reveal the necessity of early prediction in this patient group. Therefore, new score studies are frequently tried.

Lino et al. reported that while the Japan scoring system demonstrated success in predicting the effectiveness of interventional treatments, the study was limited by a small patient cohort and the exclusive focus on Japanese participants. Choi et al. in their study showed that the Japan score was not successful in South Korean patients [16]. John et al. on the other hand, in a study conducted on 1048 patients from South Korea, the Japan score was found to be more successful than other scores in predicting the need for interventional procedures. [17] Similarly, in our patient group, the Japan score was successful in predicting endoscopic intervention. This score includes effective indicators of hemodynamic status of patients such as systolic blood pressure, hemoglobin and blood urea nitrogen. In addition, it includes indicators of UGIB severity such as Hematemesis and Syncope [10] Several studies have shown that these parameters are associated with mortality and poor outcome in UGIB. In the Japan score, the parameters are evaluated from 1 to 3 points.. In AIMS65, each parameter is calculated with only 1 point. While the Japan score has 5 parameters, GBS has 9 parameters and Pre-Rockall has only 3 parameters. According to Cazacu et al., GBS and RS are difficult to use in emergency departments due to their complexity and low accuracy [15]. We think that the use of the Japan score will become widespread due to its advantages such as stronger prediction and simple use.

Although the Japan score is in an advantageous position, there are some problems that cannot be overcome. For example, syncope is a condition that is difficult to understand by patients and their relatives. Relatives of the patient may describe the patient's worsening as syncope. Another problem is low blood count, which is a common situation among young women in some countries [18]. A patient with a chronic low hemogram will get a meaningless score from this parameter and the risk level will be high. In addition, a handicap is that patients can get points on this parameter even if they use their drugs irregularly in the questioning of antiplatelet use.

In our study, we evaluated the Pre-Rockall, Glasgow Blackfort, AIMS65 and NEWS-L scores as well as the validation of the Japan score. Similarly, there are studies in the literature evaluating the mentioned scores. For example, in a retrospective cohort study by Kim et al. in which 530 patients with UGIB were included, the NEWS-L score was compared with the Pre-Rockall, Glasgow-Blatchford, and AIMS65 scores in patients with upper gastrointestinal bleeding [19]. In the composite outcome group of the study, 59 (in-hospital death in 19 patients, intensive care unit admission in 13 patients, and ≥5 units of ES replacement within 24 hours in 40 patients) were enrolled. For the composite outcome, the AUC value of the NEWS-L score was found to be the highest among the risk scores (AUC: 0.760). This value is significantly higher than that of the pre-Rockall score (AUC: 0.660). However, there was no significant difference when compared with the AUC value of the Glasgow-Blatchford score (AUC: 0.700) and that of the AIMS65 score (AUC: 0.760). The NEWS-L score showed better discriminant performance than the pre-Rockall score, discriminant performance comparable to GBS and AIMS65, and it has been shown that the NEWS-L score can be used to identify low-risk patients among patients with UGIB [19]. Although no significant difference was found in the diagnostic test performances of the scorings in the current study, the probability of type 2 error is high due to the limited sample size of the study.

Limitation

There were some limitations in our study. The first is that it was carried out in a single center. Second limitation is the limited sample size. Another factor limiting the generalizability of the results of our study is that only patients who underwent endoscopic evaluation were included. This could be interpreted that clinicians do not perform endoscopic evaluation for patients they consider to be at low risk for UGIB. This may have led to the exclusion of low-risk patients from our study.

Conclusion

The Japan score is as successful in the Turkish patient population as it is in the Japanese and South Korean patients. The Japan score, which is easier to use and has a stronger predictive ability, can be used in this patient group compared to the relatively older scorings used to predict endoscopic intervention in UGIB.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Funding: *None*

Conflict of interest

The authors declare no conflict of interest.

References

1. Akça HŞ, Özdemir S, Algin A, Kar E, Altunok İ. Evaluation of the efficacy of the clinical frailty scale in the prediction of prognosis in geriatric patients presenting to the emergency department with acute abdominal pathologies: a prospective study. Kocatepe Medical Journal. 2023;24(1):36-42.

2. Akça HŞ, Algin A, Özdemir S, Yilmaz B, Altunok İ. Evaluation of the relationship of hemogram parameters with prognosis in older adults with acute abdominal pathologies. Journal of Health Sciences and Medicine. 2022;5(2):385-92.

3. Dolek UC, Ozdemir S, Babayeva K, Gol M. Leech Application-related Upper Gastrointestinal Bleeding: A Case Report. Bull Emerg Trauma. 2023;11(1):47-50.

4. Hreinsson JP, Kalaitzakis E, Gudmundsson S, Björnsson ES. Upper gastrointestinal bleeding: incidence, etiology and outcomes in a population-based setting. Scand J Gastroenterol. 2013;48(4):439-47.

5. Kamboj AK, Hoversten P, Leggett CL. Upper Gastrointestinal Bleeding: Etiologies and Management. Mayo Clinic Proceedings. 2019;94(4):697-703.

6. Yahya H, Umar H, Shekari BT, Sani K. Endoscopy for Upper Gastrointestinal Bleeding in a Tertiary Hospital in Kaduna, North-West Nigeria: Experience and Findings. Ann Afr Med. 2022;21(3):262-8.

7. Alimoğlu F, Özkan A, Çalık M. Evaluation of the shock index and different scores in predicting the mortality in upper gastrointestinal bleeding. J Clin Med Kaz. 2023;20(3):32-7.

8. Kılıç M, Ak R, Hökenek UD, Alışkan H. Use of the AIMS65 and pre-endoscopy Rockall scores in the prediction of mortality in patients with the upper gastrointestinal bleeding. Ulus Travma Acil Cerrahi Derg. 2023;29(1):100-4.

9. Taslidere B, Sonmez E, Özcan AB, Mehmetaj L, Keskin EB, Gulen B. Comparison of the quick SOFA score with Glasgow-Blatchford and Rockall scores in predicting severity in patients with upper gastrointestinal bleeding. Am J Emerg Med. 2021;45:29-36.

10. Sasaki Y, Abe T, Kawamura N, Keitoku T, Shibata I, Ohno S, et al. Prediction of the need for emergency endoscopic treatment for upper gastrointestinal bleeding and new score model: a retrospective study. BMC Gastroenterol. 2022;22(1):337.

11. Iino C, Mikami T, Igarashi T, Aihara T, Ishii K, Sakamoto J, et al. Evaluation of scoring models for identifying the need for therapeutic intervention of upper gastrointestinal bleeding: A new prediction score model for Japanese patients. Dig Endosc. 2016;28(7):714-21.

12. Kim JS, Kim B-W, Kim DH, Park CH, Lee H, Joo MK, et al. Guidelines for Nonvariceal Upper Gastrointestinal Bleeding. Gut Liver. 2020;14(5):560-70.

13. Guo CLT, Wong SH, Lau LHS, Lui RNS, Mak JWY, Tang RSY, et al. Timing of endoscopy for acute upper gastrointestinal bleeding: a territory-wide cohort study. Gut. 2022;71(8):1544-50.

14. Cryer BL, Wilcox CM, Henk HJ, Zlateva G, Chen L, Zarotsky V. The economics of upper gastrointestinal bleeding in a US managed-care setting: a retrospective, claims-based analysis. J Med Econ. 2010;13(1):70-7.

15. Cazacu SM, Alexandru DO, Statie R-C, Iordache S, Ungureanu BS, Iovănescu VF, et al. The Accuracy of Pre-Endoscopic Scores for Mortality Prediction in Patients with Upper GI Bleeding and No Endoscopy Performed. Diagnostics. 2023;13(6):1188.

16. Choi SW, Moon HS, Kwon IS, Sakong H, Kang SH, Sung JK, et al. Validation and Comparison of the Japanese Score and Other Scores in Patients with Nonvariceal Upper Gastrointestinal Bleeding: A Retrospective Study. Digestive Diseases. 2023;41(1):66-73.

17. Jeon HJ, Moon HS, Kwon IS, Kang SH, Sung JK, Jeong HY. Which scoring system should be used for non-variceal upper gastrointestinal bleeding? Old or new? Journal of Gastroenterology and Hepatology. 2021;36(10):2819-27.

18. Jadhav S, Khaparde S. Study of the red cell indices, hemogram and platelet variations in anaemic (<10gm%) patients by automatic cell counter in a tertiary care centre, Ahmednagar, Maharashtra, India. International Journal of Research in Medical Sciences. 2022;5:1582-7.

19. Kim D, Jo S, Lee JB, Jin Y, Jeong T, Yoon J, et al. Comparison of the National Early Warning Score+Lactate score with the pre-endoscopic Rockall, Glasgow-Blatchford, and AIMS65 scores in patients with upper gastrointestinal bleeding. Clin Exp Emerg Med. 2018;5(4):219-29.

How to cite this article:

Abuzer Özkan, Kadir Özsivri, Serdar Özdemir, Abuzer Coşkun. *Validation of the Japan score in patients with upper gastrointestinal system bleeding and comparison with other scores. Ann Clin Anal Med 2023;14(9):854-858*

This study was approved by the Ethics Committee of Umraniye Training and Research Hospital (Date: 2022-08-11, No: 258)